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Toy Building Blocks

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The present invention relates to toy building blocks. Particularly to building blocks suitable for connection to one another.

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The educational value of children's building block systems is well known and a number of systems have been proposed and/or reached commercialisation. Known building block systems are disclosed in, for example, GB-A-231502, GB-A-2118447, GB-A-1350621, GB-A-1376301, US-A-5683283 and US-A-4602908.

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An improved building block and system has now been devised.

20 According to a first aspect, the invention provides a toy building block including:

25 (a) a first pair of respectively transversely extending face panels provided with male gender connection formation means facilitating connection with respective adjacently arranged blocks, the male gender connection formation means for each face comprising at least two substantially identical studs;

30 (b) a second pair of respectively transversely

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extending face panels provided with female gender connection formation means facilitating connection with respective adjacently arranged blocks, the female gender connection formation means for each face panel comprising at least two substantially identical sockets;

Wherein, the sockets are shaped and dimensioned to be push-fit/interference-fit engageable with respective studs on adjacently connecting corresponding blocks, the studs and sockets on the face panels of the block being so spaced and configured to permit connection with opposite gender face panels in a plurality of connection configurations, including a face panel aligned configuration and a face panel overlap configuration.

The arrangement of transverse/substantially perpendicular face panels provided with connection formation means facilitating connection with an adjacently arranged blocks enables blocks to be connected side by side as well as one upon another. This enables a highly versatile building block system to be achieved.

The studs and sockets on the male and female gender face panels are preferably spaced from one another by a distance of substantially  $2x$ , where  $x$  is the distance between the edge of the panel and the nearest extremity of a respective stud or socket. Desirably the spacing between adjacent studs or sockets on a respective face panel is substantially  $2x$ . Beneficially, the distance

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between the extremities of a stud or socket (corresponding to the diameter for circular perimeter formations) is substantially 2x. The outer perimeter of the face panels is preferably square such that the overall configuration of the block is cuboid. The respective studs and sockets on the male and female gender face panels are preferably arranged in 2 x 2 arrays.

The block according to the invention permits a female gender face panel of a connecting corresponding block to be connected to the complementary male gender face panel of an object block in a plurality of configurations in which the connection may be facilitated by engagement of one, two or four pairs of engaging opposed gender formations. In the embodiment defined, the four formation engagement would give a face panel to face panel match up (face panel aligned configuration); one or two pairs of engaging formations give a face panel overlap configuration. Where one pair only of formations are used to make the connection, the corresponding face panels of adjacent blocks may be inclined at angles to one another. Where circular perimeter formations are utilised, the one pair connection configuration enables the connected blocks to be rotated relative to one another about the connected formations.

Desirably the block comprises two sets of opposed face panels provided with connection formation means.

Desirably non-opposed face panels (and also preferably opposed face panels) are of substantially the same face

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area.

Desirably at least one of the faces of the block is without connection formation means. Preferably two face panels of the block (most preferably opposed face panels) are without connection formation means. It is preferred that one or more face panels without connection means are arranged to carry an indicia, design, character or other graphic representation. This enables for example a large 'composite' picture to be built up from an assembly of blocks, or words to be formed using connected blocks each carrying a respective letter character.

Desirably opposed faces of the block are provided with connection formations of opposed gender.

The cube shaped block provides the 'basic' constructional element of a children's building block system. Other shaped blocks are envisaged as comprising the system including for example triangular face panelled blocks and rectangular face panelled blocks

According to a further aspect the invention therefore provides a toy building construction system or kit comprising a plurality of building blocks according to the first aspect of the invention.

According to a further aspect, the invention provides a building block comprising a male gender face panel having an array of rows and columns of stud formations and a female gender face panel having an array of socket

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formations corresponding to the male array of studs, the studs and sockets on the male and female gender face panels are preferably spaced from one another by a distance of substantially  $2x$ , where  $x$  is the distance between the edge of the panel and the nearest extremity of a respective stud or socket.

Beneficially, the distance between the extremities of a stud or socket (corresponding to the diameter for circular perimeter formations) is substantially  $2x$ .

The connection formation means for a respective face therefore preferably comprises an array of formations arranged to mate with a complementary array provided on an adjacently connecting block. The array preferably has a perimeter spaced inwardly from the edge of a respective face. The array preferably comprises formations of all male studs or all female recesses. Desirably, the formations comprising the array have an axis and are most preferably substantially circular in cross section along a plane substantially parallel to the respective face. Beneficially, the depth of the formations is less than the width dimension (e.g. the diameter) of the respective formation. The spacing between the formations in the array is preferably greater than the distance between the formations and their respectively closest edge of a respective face. Desirably an array comprises four formations arranged in a two by two matrix.

It is preferred that the toy block is substantially hollow. Preferably the block comprises a plastics

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material, the block comprising, preferably moulded plastics material, the connection formation means preferably being integrally moulded with the respective face.

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Desirably the block comprises a moulded plastics building block comprising a moulded shell element including wall panels moulded to be configured rigidly extending transversely to one another in fixed relationship with a defined angle therebetween, and closure means to close a hollow interior of the block, the closure means including one or more wall panel elements to be connected to the shell element.

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Accordingly, a further aspect of the invention provides a method of manufacturing a toy building block, the method comprising assembling:

- i) a moulded plastics shell element including wall panels moulded to be configured rigidly extending transversely to one another in fixed relationship with a defined angle therebetween; and,
- ii) a separate wall panel element connecting with the walled shell element to close an interior of the block.

Forming the block in this way enables the shell element and shell closing wall panel element to be moulded separately permitting construction of a block having

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male/female connection elements on perpendicular face panels. This is difficult to achieve with conventional 'one shot' block moulding techniques.

5 The moulding preferably forms the connection formation means integrally with the respective faces.

Desirably the moulded shell element is formed having male connection formation means on a first face panel and female connection means on a second face panel. It is preferred that the moulded shell element is formed having connection formation means on opposed face panels, preferably male connection means on a first face panel and female connection means on the opposed face panel. The moulded shell element is preferably formed as a tube having orthogonal wall panels.

Desirably the shell element and the separate end face panel are provided with complementary engageable securing formations permitting the end face panel to be securely and preferably effectively permanently fixed across the opening of the shell element. Alternatively or additionally a bonding material (such as a curable bonding material) may be applied to the shell element and/or the end face panel element and/or the complementary engageable securing formations to facilitate fixing.

The complementary engaging securing formations are preferably configured such that either a push fit engagement or a snap fit engagement is provided. desirably, the complementary engaging securing formations

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are provided at the periphery of the wall panel element and the opening of the shell element.

In a preferred embodiment the complementary engaging securing formations preferably comprise pins arranged to be received in complementary dimensioned bores in a push fit engagement. Additionally or alternatively it is preferred that the complementary engaging securing formations comprise tongue and groove like mating elements (such as a tab receivable in a slot) extending along one or more edges of the face panel element and shell element. It is preferred that the tongue and groove like engaging formations are push fit engageable with one another.

In a preferred embodiment, the shell element comprises a substantially tubular element having opposed open ends, each of which is closed by a respective separate end wall panel element. The tubular element preferably has four face panels defining a cube shape when the separate end wall panel elements are fixed in position.

The separate end wall panel elements preferably include connection formation means facilitating connection with an adjacently arranged blocks. It will be readily apparent, that the block and method of construction provided by the invention permit the shell element to be combined with various configurations of connection formation means (male female or none) enabling a maximum versatility for manufacture using basic components. Additionally face panels of various colours may be fixed to shell elements of different colours to enhance the visual stimulatory



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effect. This is perceived to be a major advantage of the invention over prior art blocks.

According to a further aspect, the invention provides an  
5 assemblage comprising a plurality of image elements having  
commonly coded image edge portions which permit image  
elements to be positioned in an edge adjacent relationship  
in a plurality of configurations in which the commonly  
coded image edge portions of adjacent elements are matched  
10 substantially to one another.

Desirably, the image element comprises upper and lower  
edges and two side edges such that the image element is  
preferably rectangular or square. Desirably the upper  
15 edge is coded to match with the lower edge and the side  
edges coded to match one another.

It is preferred that the image elements are provided with  
first and second opposed edges of a first common image  
20 coding and third and fourth edges of a second common image  
coding.

Beneficially, the coded image element edge portions are  
coded imagewise such that the coding of the edge portions  
25 is effected by portions of a general image or scene  
depicted upon relevant image elements.

Desirably coded image element edge portions comprise a  
plurality of differently coded zones along respective edge  
30 portions.

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The coded image element edge portions are preferably coded by means of colour (preferably coloured edge zones).

In a preferred embodiment the image element includes commonly coloured upper and lower edge zones and commonly coloured opposed side edge zones.

The coloured edge zones preferably comprise a backing to a primary image, character or other emblem presented on the element.

The image element is beneficially arranged to be mounted on a face panel of a toy building block, preferably a toy building block including connection formation means facilitating connection with an adjacently arranged blocks. Most preferably, the image element is arranged to be mounted on a face panel of a toy building block in accordance with the first aspect of the invention.

According to a further aspect, the invention provides a toy building construction kit or set comprising:

a plurality of a toy building blocks including face panels (preferably substantially perpendicular face panels) provided with connection formation means facilitating connection with an adjacently arranged blocks; and,

a plurality of image elements for mounting on substantially planar faces of respective blocks, the image elements having commonly coded image edge

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portions permitting image element carrying blocks to be positioned in an edge adjacent relationship in a plurality of configurations in which the image edge portions of adjacent elements are matched substantially to one another.

In one embodiment, the image elements are adhesive backed permitting a user to apply a desired set of image elements to a set of blocks. Alternatively, the image elements may be printed or moulded onto the relevant face panel.

The invention will now be further described in specific embodiments by way of example only and with reference to the accompanying drawings, in which:

Figure 1 is a perspective exploded view of a first embodiment of toy building block according to the invention;

Figure 1a is a scrap sectional view of the face panel securing engagement connection with the shell element;

Figure 2a is a schematic plan elevation of a toy building block according to the invention having an end panel element not in position;

Figure 2b is a schematic side view of the building block having end panel elements not in position;

Figure 2c is a schematic sectional view of the securing bore of the shell element;

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Figure 3a is a schematic plan view of a first end panel element (moulded with an integral array of male studs);

Figure 3b is a schematic side view of the end panel element of Figure 3a;

Figure 4a is a schematic plan view of a second end panel element (moulded with an integral array of female recesses);

Figure 4b is a schematic side view of the end panel element of Figure 4a;

Figure 5 is a schematic part sectional view of a securing fixing pin carried by the face panel elements;

Figure 6 is an exploded perspective view of an alternative embodiment of building block according to the invention;

Figure 7 is a schematic view of a building block carrying an exemplary image element for use in creating an assemblage according to the invention;

Figure 8 is a schematic view of an array of connected blocks (including the block of figure 7) in an assemblage according to the invention; and,

Figure 9 is a schematic view of the array of blocks in figure 8 connected in an alternative assemblage configuration.

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Referring to the drawings, and initially to Figure 1, the children's toy cube building block (generally designated 1) comprises a tubular moulded plastics body 2 having integrally moulded face panels 2a, 2b, 2c, 2d defining a unitary wall around an internal void region. Face panels 2b and 2d are provided with respective two by two arrays of block-to-block connection formations, panel 2b being provided with all-male cylindrical stud studs 3 and face panel 2d including a corresponding array of cylindrical recesses 4. The shape, dimension and spacial configuration of studs 3 and recesses 4 is such that the array of studs 3 on face 2b of first toy building block can matingly engage in releasable push fitting engagement with a complimentary array of recesses for an adjacently connected building block. Similarly, recesses 4 on face panel 2d receive an array of studs on a further adjacently connected building block.

An important feature of the invention is that, for the moulded, substantially hollow, tubular element 2, the array of male studs 3 is provided on an opposed face to the array of female recesses 4. This enables the tubular element to be moulded using relatively standard plastics injection moulding techniques.

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A recessed shoulder 4 is provided around each respective open end of the tubular element 2, the recessed shoulder being enlarged at respective corner bosses 5, each of which is provided with a blind bore 6. The upper surface of the shoulders 4 are provided with respective elongate slots 11.

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5 Separate end wall panels 7, 8 of moulded plastics construction are provided with integrally moulded pins 9 shaped, dimensioned and configured to matingly engage in push fit connection with respective blind bores 6 provided in the bosses 5 of the recessed shoulder 4. The longitudinal edges of the separate face panels 7, 8 are provided with downwardly extending integrally moulded tabs 12 shaped, dimensioned and configured to matingly engage in push fit connection with respective slots 11 provided in the recessed shoulder 4. When push fit mated into the respective bores 6 and slots 11, the pins 9 and tabs 12 ensure that the respective end face panel 7, 8 is securely (and effectively permanently) secured to the tubular element 2 and effectively closing the hollow interior of the block.

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20 As shown in figure 5, pins 9 taper outwardly from a root connecting to the panel element 7,8, to a head 15 chamfered to ease insertion into respective bores 6. The maximum diameter of the head of pin 9 is greater than the root diameter; such an outwardly tapering pin enhances the interference fit of pins 9 on bores 6.

25 The face panel fixing arrangement including the corner pins 9 and elongate slot and tab mating provides particularly good and effectively permanent connection between the shell element and the end face panels. The pins 9 and bores 6 ensure good connection force at the corners; the slots 11 and tabs 12 ensure good connection  
30 along the end face panel edges. The pull apart force required to separate the end panel faces from the shell

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element is significantly greater than the force required to separate adjacently connected blocks by disengaging a male stud array 3 from a female recess array 4.

5 An important feature of the invention is the flexibility of the arrangement, in that respective end face panels 7, 8 may be provided with an array of male studs 3 or female recesses 4. This enables a "core" module comprising the tubular element 2 to be connected with end panels 7, 8 as required enabling a variety of different building block configurations and designs to be manufactured from a number of "core" elements. For example, blocks having from three male stud arrays and one female recess array to one male stud array and three female recess arrays are possible. It will also be appreciated that end elements 7, 8 could, additionally, comprise planar face elements (not including any male or female formations 3, 4). Additionally, the flexibility of the design enables end face panels 7, 8 of different colours, textures or other variables to be mated with the tubular element 2.

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25 A further important feature relates to the arrangement and configuration of the male studs 3 and female sockets 4. As shown most clearly in figure 2b The studs 3 and sockets 4 on the male and female gender face panels are spaced from one another by a distance of substantially  $2x$ , where  $x$  is the distance between the edge of the panel and the nearest extremity of a respective stud 3 or socket 4. The diameter of respective studs 3 or sockets 4 is substantially  $2x$ .

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5 The block according to the invention permits a female gender face panel of a connecting corresponding block to be connected to the complementary male gender face panel of an object block in a plurality of configurations in which the connection may be facilitated by engagement of one, two or four pairs of engaging opposed gender formations. In the embodiments shown, engagement of studs 3 of an adjacent identical block with all four sockets 4a,4b,4c,4d would give a face panel to face panel match up (face panel aligned configuration); engagement of the identical block with two sockets (for example 4a and 4b only) would give a face panel overlap configuration for the connected blocks. Where an adjacent block is connected by a single stud only engaging, for example socket 4a , the corresponding face panels of adjacent blocks may be inclined at angles to one another, and furthermore the connected blocks can be rotated relative to one another about the connected stud 3 and socket 4a. The system is therefor extremely versatile in the constructional arrangements permitted and therefore provides an enhanced educational system.

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25 Referring now to Figure 6, there is shown an alternative embodiment of toy building block 101 according to the invention in which the tubular element 102 again includes respective arrays of male studs 103 and female recesses 104 provided on opposed faces.

30 The end face panels 107, 108 which connect with tubular element 102 (and thereby close the open ends) are provided at opposed edges with collar studs 109 which are arranged



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to slide over respective ramp formations 106 (provided on the internal faces of panels 102d, 102b), and snap back to a "normal" position abutting a rear shoulder of ramp 106. The abutment of collars 109 with the rear shoulders of  
5 respective ramp formations 106 substantially inhibits disassembly of the respective end face panels 107, 108 from the tubular element 102.

One or both of the planar face panels (for example panels 2a, 2c in figure 1) are typically provided with an image or character element. When upper or lower or side by side adjacent blocks are connected a character or image wall depicting a series of images or characters can be built up. Letter characters can be used to build up words and sentences and thereby aid in reading development of  
10 children.

Alternatively, adjacent image elements can be used to build up a composite image (in a similar manner to assembling a jigsaw puzzle). In a preferred embodiment the image elements in a set of toy construction blocks have commonly coded image edge portions permitting the images on the blocks to be assembled in a variety of different configurations whilst maintaining sense of the  
15 overall image. Such an arrangement is shown in figures 7 to 9.

The block shown in figure 7 has upper and lower fringe edge) zones of orange colour. All other blocks in the assemblages of figures 8 and 9 include corresponding upper  
20 and lower fringe zones of orange colour. This permits any

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of the blocks in the array to be connected with any other block in an upper or lower connecting position and the orange colour fringes will match up. The block shown in figure 7 has side edge connecting bands 22, 23 extending across the image and providing a backing scene to the primary images of the old man 24, bird 25 and tree 26. The side edge connecting band 22 is yellow in colour; the side edge connecting band 23 is green in colour. All other blocks in the assemblage arrays of figures 8 and 9 include corresponding yellow and green colour edge connecting bands. This permits any of the blocks in the array to be connected with any other block in a side edge to side edge connecting position and the yellow and green colour bands will match up.

This system has a benefit in that it is extremely easy for a child to achieve a progress result, and also begins to teach colour matching.

The use of a 'jigsaw' wall built up from image carrying elements using blocks having block to block connection formations on perpendicular faces enables a solid and sturdy image construction to be conveniently achieved.